

Report N° 2

## THE KOLWEZI - MANKOYA STRIP

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### INTRODUCTION

This strip is formed by the ERTS-imagery identified as 1072-07544, -07551, -07553 and -07560 in the four spectral bands. It covers a North-South area from Kolwezi-city (Zaire) to the Lui-Zambezi confluence (Zambia), an area of about 600 x 185 km. This area is a part of the plateaus south of the Zaire-basin (in former times : Congo-basin). These plateaus are generally covered with savannah, degrading from a savannah woodland to a savannah grassland; locally the vegetation becomes a steppe.

The analysis of the landscape pattern, identifiable on the imagery, will allow us to divide the area in land systems and subsystems of a certain homogeneity in their features. However human features are difficult to recognize on the imagery because they are too small or covered by clouds. Only in the North have we recognized important features of human presence, namely sparse cultivation areas. The regional geography around Kolwezi has formed the objective of a study of the airphotographs with a knowledge of ground conditions (J. Sterckx, 1972).

The analysis of landscape pattern on the ERTS-imagery, especially spectral bands 5 and 7, allows us to consider four land systems, each of which can be divided in subsystems.

### ANALYSIS

#### 1. The "Lualaba-Zambezi divide" system

A great deal of this area is covered by altostratus, especially the Northeast, and there an identification of features is almost impossible. General features of the system are the savannah woodland and a high density of drainage lines with a dominant dendritic pattern.

##### 1.1. The "Upper-Lualaba" subsystem

is characterized by the artificial lake - in the Lualaba-river - hardly perceptible through the altostratus. The Lualaba forms large meanders upstream of the lake. Probably there are also marshes along the stream.

##### 1.2. The "Upper-Lubudi" subsystem

This subsystem lies west of the Upper-Lualaba. The savannah woodland is interrupted locally by grassland areas several square

kilometers in area. They are monotonous steppic grasslands, called by the bantou name "dilungu", which cover the very flat plains on the divides and during the wet season become marshy.

Important cultivation areas are recognizable in the surroundings of the Upper-Mukuleshi, a tributary of the Lubudi.

### 1.3. The "Mwinilunga" subsystem

This appears as a marshy area on the Lualaba-Zambezi divide, which looks very horizontal here.

### 1.4. The "Upper-Kabompo" subsystem

In this area the savannah woodland is already interrupted by an extensive savannah grassland in the West. The drainage density seems also a little higher in the eastern part than in the West. A special feature is formed by the drainage pattern: the drainage lines shown two main directions, each perpendicular to the other. We presume the drainage system is controlled by crossed geofracture patterns.

## 2. The "Kabompo-Luena" system

The savannah grassland is the typical vegetation cover, but the most important feature of the whole area is the small density of drainage lines compared to the former system.

### 2.1. The "Lusongwe-Kabompo" subsystem

The plateau is covered by wet grassland (Band 5) due either to a high aquifer or to the first rains of the beginning wet season.

In the eastern part the valleys are shallow V-shaped and covered by dry grassland, while in the west they are flat-floored and marshy. The parallel drainage lines are perpendicular to the NNE-SSW directed Kabompo-river; probably it is a geofractures controlled drainage pattern.

### 2.2. The "Kabompo-valley" subsystem

This region has been limited to the strict valley of the middle Kabompo-river, which is flat-floored with a large alluvial plain. The river itself describes well formed meanders (amplitude 1 à 2 km, wavelength 3 à 4 km).

### 2.3. The "Chifuwe" subsystem

The vegetation cover is characterized by important marshy areas on the plateau. The drainage pattern is parallel with a NNE-SSW direction, and it is probably controlled by geofractures too.

### 2.4. The "Dongwe-Luena" subsystem

Characteristic features are the discontinuous grassland cover, the poor superficial drainage and marshy areas on the plateau. Probably these features are due to the thick cover of Kalahari sands and to the absence of a sufficient slope. Few small depressions (blowouts) on the plateau itself form a secondary feature.

## 2.5. The "Luampa" subsystem

This corresponds to the Luampa-valley, small and flat-floored, with marshes on the valley-side of the Dongwe and Lalafuta rivers.

N.B. The area between the Maninga and the Kabompo rivers is not discussed because it probably belongs to a larger area west of the strip.

## 3. The "Dongwe" system

This area appears as a transitional area between system 1 (Lualaba-Zambezi divide) and system 2 (Kabompo-Lunena). The drainage density is higher than in system 2 but not so high as in system 1. The drainage lines show two directions, forming mutually an acute angle and being controlled by crossed geofracture patterns. The vegetation is a savannah.

## 4. The "Lui" system

This region is characterized by savannah grassland. The drainage lines are of low density and form a dendritic pattern. The main valleys have broad alluvial plains with a marshy vegetation. Other important features are the numerous closed depressions or blowouts on the divides. One can observe a NNE-SSW trend in the direction of the blowouts on the plateau.

### 4.1. The "Luena" subsystem

corresponds to the basin of the lower Luena and is characterized by the large Luena flats, a marshy alluvial plain along the river.

### 4.2. The "Lui-basin" subsystem

Here we had to correct the exact position of all tributaries of the Lui-river. The basin is asymmetric and alluvial plains appear along all the rivers. The secondary tributaries of the Lui often show, at their head, a direction parallel with the trend of the blowouts. This could be due to a micro-relief of the surface, possible fossil dunes alternating with the blowouts.

### 4.3. The "Zambezi" subsystem

The very numerous blowouts are the characteristic feature of this area. In the North of the area the blowouts are clearly elongated in a NNE-SSW direction, while elsewhere they are more circular. The Zambezi-valley is characterized by a floodplain with abandoned meanders, small pools and marshy flats, while the Zambezi itself describes active meanders in the floodplain forming slip-off slopes and undercut slopes.

## CONCLUSIONS AND INTERPRETATIONS

We have noted a clear difference between the landscape pattern of the Lualaba-Zambezi divide system and that of the other systems, south of the former. This difference is expressed in the vegetation and in the drainage density :

- (1) the savannah woodland is dominant in the Lualaba-Zambezi divide system, while a savannah grassland dominates in the other areas;
- (2) the drainage density is much higher in the Lualaba-Zambezi divide system than elsewhere.

The limit between the Lualaba-Zambezi area and the neighbouring systems (Kabompo-Luena and Dongwe) is sharp. Compared with the geological map of Zambia (1962) this limit corresponds approximately to the southern and western outcrops of the Katanga Group (Precambium) which consists of shales, sandstones and limestones. This lithology and the flatness of the Lualaba-Zambezi divide explain the high density of drainage lines and also the marshes in the Mwinilunga subsystem. Locally, namely on the plateaus and the large interfluves, the Katanga Group is covered with more previous Kalahari sands (Tertiary) and then islands of savannah grassland appear.

The southern geographic systems (Kabompo-Luena, Dongwe and Lui) have been developed on the Kalahari system. There the dominant grassland savannah is a result of the quartzic, leached soils on Kalahari sands. On the other hand the images show two areas (Lusongwe-Kabompo and Dongwe-Luena) marked by verdant grassland (indicated by the dark tones on spectral band 5), which probably results from the first rains at the beginning wet season. (In fact the images are taken on 3rd october 1972). The marshes on the plateau also extend in the wet season. The seasonal evolution of the Kabompo-Luena system will be more clearly seen when repeated ERTS-coverage is available.

The drainage pattern is dendritic in the northern and southern parts of the strip, but in the central part (the Upper-Kabompo, the Lusongwe-Kabompo and the Chifuwe subsystems and also the Dongwe system) the drainage lines are controlled by crossed geofracture patterns developed in the Katanga Group which underlies the Kalahari system.

There remains the problem of the numerous blowouts in the SW of the strip. They are concentrated manifestly on the central part of the interfluves; this location may be explained by maximum deflation of the drier parts of the stream divides. The presence of blowouts is a more common feature on the Kalahari plateaus. J. De Ploey (1965) describes identical forms in the Kwango (Zaire) as blowouts dating from a Upper Pleistocene semi-arid period. A deflation topography has also been recognized on the Manika-plateau, south of Kolwezi (J. Sterckx, 1972). On the air-photographs of the grassland covered plateaus in the surroundings of Kolwezi this deflation topography is found in areas of varying size. Here most of the blowouts are elongated in a nearly E-W direction. Between the blowouts microforms with an axis in the same direction can be observed, they are described by S. Alexan-

dre-Pyre (1971) as elongated fossil dunes. Probably a similar microtopography with a trend nearly ENE-WSW is present between the blowouts in the Lui system.

The southern part of the strip shows no human features on the imagery except for the Mankoya-Mongu road in the Lui system and sparse cultivation along the Solwezi-Nkulwashi road in the Dongwe system. But in the Upper-Lubudi subsystem cultivation areas become more important and form a scattered pattern in the savannah woodland.

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# LEGEND

Scale 1/1 000 000

## Physical features

geofractures



lineament



fault scarp



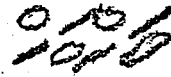
graben



blowouts



and fossil dunes



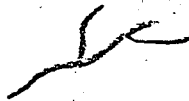
marsh



lake



river pattern



grassland (wet)



## human features

scattered or dense settlement,  
cropping and fallow land



road

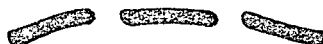


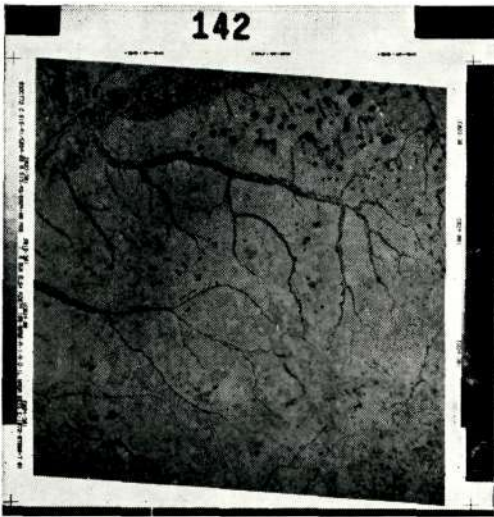
## Regional-geographic classification

limit of systems

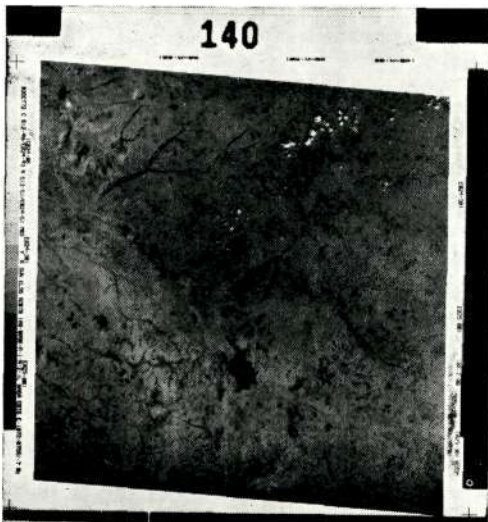


limit of subsystems





Zambezi-Lui-confluence  
Blow-outs



Lusongwe-Kabompo area  
parallel drainage pattern

6

6





**FOLDOUT-FRAME**

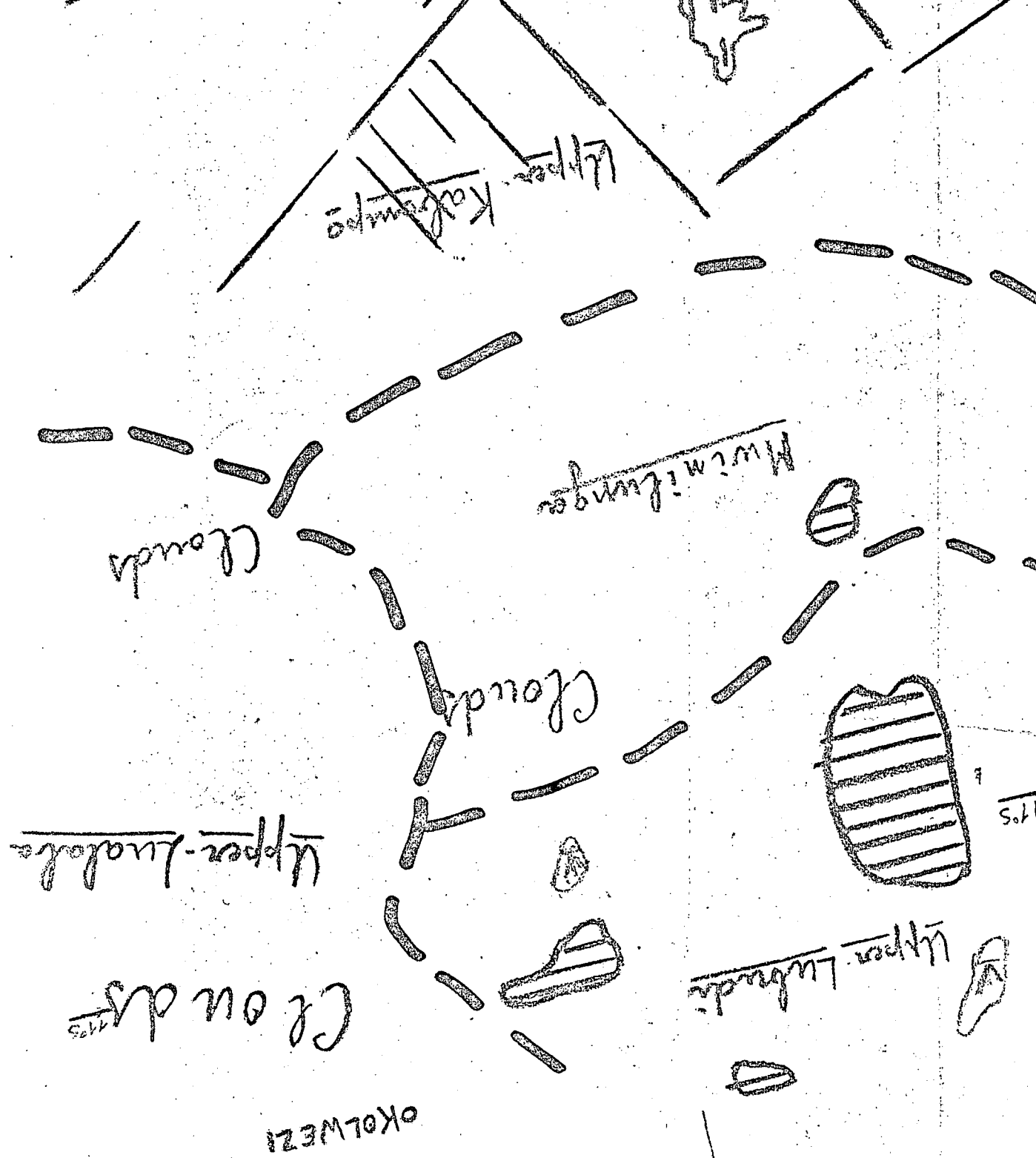
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Uema System



Luabala-Zambesi divide System



OKOLWEZI

